

## A Boom in Boomerangs



AMONG SPINOFFS FOR CONSUMER, HOME AND RECREATIONAL USE, NASA AIRFOIL TECHNOLOGY IS HELPING TO SPUR AN INTERNATIONAL UPSURGE IN BOOMERANG COMPETITION

Though still of modest scope, the sport of boomerang throwing is experiencing rapid growth and regularly finding new devotees in many nations of the world.

The boom is recent. Although boomerangs have been used as war and hunting tools for more than 20 millennia, it was not until the decade of the 1970s that boom throwing became an organized competitive sport.

In the United States, there are now scores of local and regional contests annually and, since 1980, an annual national championship. There are similar competitions in a number of foreign countries, notably Australia, Canada, Belgium, France, Germany, Sweden, Poland, Italy, the Netherlands, Switzerland and Japan. And, for the last decade, there has been a series of well-attended international competitions.

Since the boomerang is most often associated with Australia, one might expect that the Aussies dominate world competition. Not so. Surprising as it might sound, the



This is a time exposure of a night boomerang flight launched by championship-level competitor Ron Tamblyn. Modified by designer Eric Darnell to include a light source at a blade tip, the L-shaped "boom" traces an elliptical path covering some 120 yards outward from the invisible thrower and back to him. Boomerang competitors use this night time exposure approach to obtain photographic information on performance characteristics that is useful in designing new types of booms.

Shown with some of his products, boom designer and thrower Ted E. Bailey pioneered use of NASA aerodynamics technology in boomerang shaping and became one of the sport's leading innovators.



United States—which had only a handful of “boom” hobbyists until the latter 1970s—has won every international boomerang event since 1984. And NASA technology has played a contributing role.

The boomerang is essentially an airfoil, like an airplane wing. In the same manner as the wing is designed to give the airplane a certain mode of performance, the boomerang's upper and lower surfaces can be shaped to get a desired aerodynamic effect, for example, the range, speed and accuracy of the tribesman's hunting stick, or the smooth, circular “return” flight of the sport boom.

In the U.S. and elsewhere, boomerang designers are applying aerospace technology from basic aerodynamics to computerized flight simulation. Generally, they design for optimum performance in a specific competitive event,

such as accuracy, distance, catching, two-boom juggling or maximum time aloft. As a result, the traditional crescent shape is now just one of many design forms that include triangular, cruciform, multicurve and question-mark shapes.

The use of NASA technology in boomerang design is exemplified by the work of Ted Bailey of Ann Arbor, Michigan, a well-known name in the international boomerang community. An engineer with NTN Technical Center, Bailey is a highly-ranked competitive thrower, a designer and producer of advanced technology booms, and publisher of the quarterly *Boomerang Journal*.

With the help of technology gleaned from several years' study of NASA technical reports, some provided directly by NASA, others found in the technical library at his place of employment, Bailey has become a major contributor to advancing the state of the art in boomerang competition designs. His work has also helped give U.S. throwers a competitive edge.

Bailey's interest in boomerangs began in 1974 when he was still in college and taking courses in fluid mechanics and dynamics, subjects that are close cousins to aerodynamics. He bought a cheap plastic boomerang and spent days trying to make it return to him—without success. He finally discovered the problem: he was left-handed, the boomerang was not. So he built a mirror image copy out of hard wood and found it flew better than the plastic original. That started a long term interest in boom throwing and designing that was to make him a record-setting competitor and a leading innovator in boomerang design technology.

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AN AMERICAN NOVICE USED NASA  
TECHNOLOGY TO BECOME A LEADING INNOVATOR  
IN BOOMERANG DESIGN



## A Boom in Boomerangs (Continued)



The shaping and notching of these ancient boomerangs, from the collection of design innovator Ted Bailey, reflects a remarkable knowledge of basic aerodynamics.

Throughout the 1970s, Ted Bailey worked in solitude on his boomerangs; he didn't even know of another boomeranger. At that time, there were no boomerang competitions outside Australia, where boom designs rarely deviated from the traditional crescent shape. Aussie competitions were very limited in scope; they consisted of a single event that combined boom catching, distance and accuracy.

Bailey found a few books on the subject and began experimenting with various boomerang shapes and sizes. Then he discovered the wealth of information on aerodynamics and low-speed airfoils available in NASA technical reports, which were to become the cornerstone of his innovative

research and development effort. These reports helped establish his hallmark approach to boomerang design: miniaturizing existing designs to enhance their competitiveness.

By 1980, a series of Smithsonian Institution workshops and competitions had spawned a fair-sized body of throwers in the northeastern United States and sparked a new direction in boom competition. Instead of the single-event Australian format, the American throwers decided to add a variety of other contests—separate events for accuracy, distance, catching, duration, etc.—to the competitive agenda.

In 1981, Bailey made contact with the growing band of U.S. throwers and it was in that year that the American group boldly challenged the Australians to a competition and, to everyone's surprise, won it. That was the first real international event.

The Australians continued to retain their single event format but the American throwers branched out further and added new competitive events as fast as they could think of them. Other countries, principally in Europe, took up the sport about this time and they adopted the American multi-event approach. Contestants from all nations started adding more and more types of boomerangs to their throwing kits, each with different flying characteristics tailored to specific events.



Modern competition-type boomerangs are sophisticated designs with flight characteristics tailored to specific events. The U.S. has established leadership in international competition and NASA airfoil technology has provided an assist.





Ted Bailey's trendsetting designs, based on NASA technology, are very popular in the U.S. and abroad. Bailey's booms are handcrafted from Finnish birch plywood, filed and drum-sanded to a predetermined aerodynamic shape, then hand-sanded and finished.

The technology race was on and Ted Bailey, armed with his library of NASA technical information and several years of self-taught know-how, became a leading designer and producer.

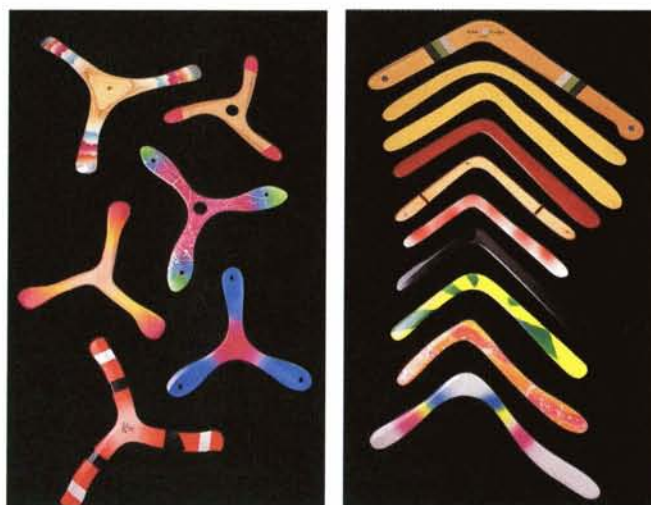
In 1981-84, Bailey introduced to competition his miniaturized booms and demonstrated the advantages of small size by winning several competitions. This started a size-reduction trend throughout the international boomerang community.

In 1984, Ted Bailey began to focus his R&D on a new MTA (maximum time aloft) type of boomerang that had originated in Germany. This large, hockey-stick-shaped boomerang could fly for as much as 40 seconds, compared with 10 seconds or so for the typical conventional boomerang. Bailey decided that MTA sticks could benefit from his miniaturization approach. Using four NASA reports as his primary input, Bailey began an intense program of experimentation with smaller booms of various designs, different arm length ratios, chord widths and angles between the two blades.

The results were spectacular. Within a few weeks of starting his MTA design program, Bailey broke the one-minute barrier with a 67 second flight, then scaled the design down further to achieve a flight of 80 seconds.

In 1985, Ted Bailey and his advanced design boomerangs dominated MTA competition. He was the first to demonstrate a throw and catch of more than two minutes (the current record, just under three minutes, was achieved by another thrower using a replica of the Bailey design). Bailey was also the first to complete the difficult "Super Catch," which involves launching an MTA boomerang, then completing five throw/catch sequences while the original boom is still aloft, then catching the original. He shared his products with his American teammates, helping the U.S. establish leadership in international competition.

Today, Ted Bailey the thrower continues to dominate MTA competition and Ted Bailey the innovator has embarked on a new line of experimentation. He is looking into practical applications of the boomerang, for example, its use as a flare carrier in military operations and its application as a much more dynamic shooting target than the clay pigeon. He has also been approached by a toy company to market a stable child's version of the MTA boomerang. Bailey is still devouring all the pertinent technical literature he can find and he is still scanning the list of NASA reports for titles that might advance boom technology another notch. ●



Boomerangs are shaped differently for different competitive events. The three-bladers pictured at left are used in "Fast-catch" events (multiple throw/catch sequences). At right is a sampling of maximum-time-aloft booms; still other shapes are used for catching, distance and accuracy.